Abstract Submitted
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**On the Role of Numerical Differentiability in the Modeling of Fluid Instabilities in Inertial Confinement Fusion Hydrodynamics Codes**[1]

S.T. ZALESAK, Plasma Physics Division, Naval Research Laboratory — The problem we wish to address is that of accurately modeling the evolution of small-amplitude perturbations to a time- dependent flow, where the unperturbed flow itself exhibits large-amplitude temporal and spatial variations. In particular, we wish to accurately model the evolution of small- amplitude perturbations to an imploding ICF pellet, which is subject to both Richtmyer-Meshkov and Rayleigh-Taylor instabilities. Any errors that we make in numerically modeling the flow, if they have a projection onto the space of the perturbations of interest, can easily compromise the accuracy of those perturbations, even if the errors are small relative to the unperturbed solution. As we have reported recently, most of the progress we have made toward our goal of accurately modeling the evolution of such small-amplitude perturbations has been achieved by imposing a "differentiability condition" on the individual numerical components of our radiation hydrodynamics codes. Here we give an update on that work, and modify our previous numerical design criteria to include the notion of "effective nondifferentiabiliy."

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